

## TERRESTRIAL ANIMAL HEALTH STANDARDS COMMISSION

## SEPTEMBER 2011 REPORT

## DRAFT CHAPTER 7.X.

**ANIMAL WELFARE  
AND BEEF CATTLE PRODUCTION SYSTEMS**

## Article 7.X.1.

**Definitions**

The ~~ad hoc~~ Group discussed the application of the OIE recommendations and decided that these should be designed with application to commercial beef production. Beef cattle production systems are defined as all commercial cattle production systems where the purpose of the operation includes some or all of the breeding, rearing and finishing of cattle intended for beef consumption.

## Article 7.X.2.

**Scope**

The first priority is to This chapter addresses the on-farm aspects of the beef cattle production systems, from birth through to finishing. The areas of emphasis are cows with calves ~~cow-calf~~, rearing, stockers or store cattle and finishing beef production. This scope does not include veal production.

## Article 7.X.3.

**Commercial beef cattle production systems**

Commercial beef cattle production systems include:

1. Intensive (stocker and finishing)

~~These are systems where~~ Would include cattle are in ~~that are place on~~ confinement and are fully dependent on humans to provide for basic animal needs such as food. ~~Animals are depending on the daily animal husbandry for provision of feed, shelter and water on a daily basis.~~

2. Extensive (all areas)

~~Would include from a wide range grazing habitat.~~ These are systems where animals have the freedom to roam outdoors, and where the animals have some autonomy over diet selection (through grazing), water consumption and access to shelter.

3. Semi Intensive (mixed)

~~Would include a combination of intensive and extensive systems.~~ These are systems where animals are exposed to any combination of both intensive and extensive husbandry methods, either simultaneously, or varied according to changes in climatic conditions or physiological state of the animals.

## Article 7.X.4.

**Criteria or measurables for the welfare of beef cattle**

The following outcome (~~animal~~) based measurables, specifically animal based measurables, can be useful indicators of animal welfare. The use of these indicators and the appropriate thresholds should be adapted to the different situations where beef cattle are managed.

1. Behaviour

Certain behaviours could indicate an animal welfare problem. These include anorexia, increased respiratory rate or panting (assessed by panting score), and the demonstration of stereotypic behaviours.

2. Morbidity rates

Morbidity rates, such as disease, lameness, post-procedural complication and injury rates, above recognised thresholds can be direct or indirect indicators of the animal welfare status. Understanding the aetiology of the disease or syndrome is important for detecting potential animal welfare problems. Scoring systems, such as lameness scoring can provide additional information.

Post-mortem examination is useful to establish causes of death in cattle. Both clinical and post-mortem pathology could be utilised as an indicator of disease, injuries and other problems that may compromise animal welfare.

3. Mortality rates

Mortality rates, like morbidity rates, could be direct or indirect indicators of the animal welfare situation. Depending on the production system, estimates of mortality rates can be obtained by analysing causes of death and the rate and temporo-spatial pattern of mortality. Mortality rates can be reported daily, monthly, annually or with reference to key husbandry activities within the production cycle.

4. Changes in weight gain and body condition score

In growing animals, weight gain could be an indicator of animal health and animal welfare. Poor body condition score and significant weight loss could be an indicator of compromised welfare in mature cattle.

5. ~~reproductive rates~~ Reproductive efficiency

Reproductive efficiency can be an indicator of animal health and animal welfare situation. Poor reproductive performance can indicate animal welfare problems. Examples may include:

- Anoestrus or extended post-partum interval
- Low conception rates
- High abortion rates
- High rates of dystocia

#### 6. Physical appearance

Physical appearance can be an indicator of animal health and animal welfare, as well as the conditions of management. Attributes of physical appearance that may indicate compromised welfare include:

- Presence of ectoparasites
- Coat that is rough or excessively soiled with faeces, mud or dirt
- Dehydration
- Emaciation
- Depression

#### 7. Handling responses

Improper handling can result in fear and distress in cattle. Indicators could include:

- Chute exit speed
- Chute behaviour score
- Percentage of animals falling
- Percentage of animals moved with an electric goad
- Percentage of animals striking fences or gates
- Percentage of animals injured during handling, such as broken horns, broken legs, and lacerations
- Percentage of animals vocalizing during restraint

#### 8. Routine procedure management and rate of ~~post-procedures~~ complications

Surgical and non-surgical procedures are commonly performed in beef cattle for improving animal performance, facilitating management, and improving human safety and animal welfare. However, if these procedures are not performed properly, animal welfare can be compromised where complications occur at levels above expected thresholds. Indicators of such problems could include:

- Post procedure infection and swelling
- Myiasis
- Mortality

#### 9. ~~post-mortem pathology~~

#### 10. ~~survivability.~~

## Article 7.X.5.

**Recommendations**

Each recommendation includes a list of relevant outcome-based measurables derived from section Article 7.X.4. This does not exclude other measures being used where appropriate.

1. Biosecurity and Animal Health

## a) Biosecurity and disease prevention

Biosecurity means a set of measures designed to protect a herd from maintain a herd at a particular health status and to prevent the entry or spread (or exit) of infectious agents.

Biosecurity programme s should be implemented, commensurate with the risk of disease. Biosecurity programmes plans should be designed and implemented, commensurate with the desired herd health status and current disease risk and, for OIE listed diseases, in accordance with relevant recommendations found in the Terrestrial Code chapters on OIE listed diseases.

These biosecurity programmes plans should address the control of the major sources and pathways routes for agents for spread of disease and pathogens transmission, as follows:

- i) cattle
- ii) other animals
- iii) people
- iv) equipment
- v) vehicles
- vi) air
- vii) water supply
- viii) feed.

Outcome-based measurables: morbidity rate, mortality rate, reproductive efficiency, changes in weight and body condition score

## b) Animal health management

Animal health management is a means a system designed to optimise the physical and behavioural health and welfare of the cattle herd. It includes the prevention, treatment and control of diseases and conditions affecting the herd, including the recording of illnesses, injuries, mortalities and medical treatments where appropriate. prevent diseases occurring in cattle herds and also providing treatments for animals when disease occurs.

There should be an effective programme for the prevention and treatment of diseases and conditions consistent with the programmes established by a qualified veterinarian and/or the Veterinary Services as appropriate.

Those responsible for the care of cattle should be aware of the signs of ill-health or distress, such as reduced food and water intake, weight gain and body condition, changes in behaviour or abnormal physical appearance.

Cattle with at higher risk ~~for from~~ of disease will require more frequent inspection by ~~animal animal handlers~~. If ~~animal handlers~~ are not able to correct the causes of ill-health or distress ~~or to correct these~~ or if they suspect the presence of a listed reportable disease they should seek advice from those having training and experience, such as ~~bovine~~ veterinarians or other qualified advisers. ~~Veterinary treatments should be prescribed by a qualified veterinarian.~~

Vaccinations and other treatments administered to cattle should be undertaken by people skilled in the procedures and on the basis of veterinary or other expert advice.

~~Animal handlers~~ should have experience in recognising and dealing with ~~caring for downer non-ambulatory~~ cattle. They should also have experience in managing chronically ill or injured animals. ~~Euthanasia on non-responding cattle should be killed humanely done as soon as recovery is deemed not possible according to Chapter 7.5 of the Terrestrial Animal Health Code.~~

Non-ambulatory animals should have access to water at all times and be provided with feed at least once daily. They Non-ambulatory animals should not be transported or moved except for treatment or diagnosis. Such Non-ambulatory animals should be moved movement should be done very carefully using acceptable methods such as a sled, low-boy trailer or in the bucket of a loader. Animals should be gently rolled on to the conveyance or lifted with a full body support.

When treatment is attempted, cattle that are unable to stand up unaided and refuse to eat or drink should be humanely killed humanely according to Chapter 7.5. as soon as recovery is deemed unlikely.

Non-ambulatory animals should not be transported according to Article 7.3.7 of the Terrestrial Code.

Outcome-based measurables: morbidity rate, mortality rate, reproductive efficiency, behaviour, physical appearance and body condition score.

## 2. Environment

### a) Thermal environment

Although cattle can adapt to a wide range of thermal environments particularly if appropriate breeds are used for the anticipated conditions, sudden fluctuations in weather can cause heat or cold stress.

#### i) Heat stress

~~The risk of heat stress for cattle~~ Thermal Heat Index (THI) is influenced by environmental factors including air temperature, relative humidity and wind speed, and animal factors including breed, age, fatness, metabolic rate and coat color. ~~As the THI increases the risk of hyperthermia increases. Also as cattle are fed longer and become fatter are more susceptible to heat stress.~~

~~Animal handlers~~ should be aware of the critical ~~THI~~ heat stress threshold for their animals. When conditions are the THI is expected to reach this threshold, routine daily ~~processes activities that require moving cattle that include cattle movement~~ should cease. ~~If As the risk of heat stress THI moves into emergency reaches very high levels the animal handlers should institute an emergency action plan that could include shade, improved access to drinking water, and cooling by the use of sprinkling water to that penetrates the hair coat.~~

Outcome-based measurables: behaviour (including panting score and respiratory rate), morbidity rate, mortality rate,

ii) Cold stress

Protection from ~~wind and rain~~ extreme weather conditions should be provided when these conditions are likely to create a serious risk to ~~where possible, particularly for young stock outdoors for the first time~~ the welfare of animals, particularly in neonates and young animals. This could be provided by natural or man made shelter structures.

*Animal handlers* should also ensure that cattle have access to adequate feed and water during cold stress. During time of heavy snowfall or blizzard, *animal handlers* should institute an emergency action plan to provide cattle with shelter, feed and water.

Outcome-based measurables: Mortality rates, physical appearance, behaviour (including abnormal postures, shivering and huddling).

b) Lighting

Confined cattle that do not have access to natural light should be provided with sufficient supplementary lighting for their health and welfare, to facilitate natural behaviour patterns and to allow adequate inspection of the animals.

Outcome-based measurables: Behaviour, morbidity, physical appearance.

c) Air quality

Good air quality is an important factor for the health and welfare of cattle ~~in intensive and confined production systems~~. It is a composite variable of air constituents such as gases, dust and micro-organisms that is strongly influenced by how facilities are managed, particularly in intensive systems ~~the management of the beef producer~~. The air composition is influenced by the stocking density, the size of the cattle, flooring, bedding, waste management, building design and ventilation system.

Proper ventilation is important for effective heat dissipation in cattle and preventing the build up of  $\text{CO}_2$ ,  $\text{NH}_3$  and effluent gases in the confinement unit. Poor air quality and ventilation are risk factors for respiratory discomfort and diseases. The ammonia level in enclosed housing should not exceed 25 ppm.

Outcome-based measurables: Morbidity rate, behaviour, mortality rate, changes in weight and body condition score gain.

d) ~~Acoustic environment~~ Noise

Cattle are adaptable to different levels and types of noise ~~acoustics environments~~. However, exposure of cattle to sudden or loud noises should be minimised where possible to prevent stress and fear reactions (e.g. stampede). Ventilation fans, feeding machinery or other indoor or outdoor equipment should be constructed, placed, operated and maintained in such a way that they cause the least possible amount of noise. Other irritating noises should also be taken into consideration, such as dogs barking and other outdoor sounds.

Outcome-based measurables: Behaviour.

e) Nutrition

The nutrient requirements of beef cattle have been well defined. Energy, protein, ~~amino acid~~, mineral and vitamin contents of the diet are major factors determining the growth, feed efficiency, reproductive efficiency, and body composition.

~~*Animal handlers* should provide cattle a level of nutrition that meets or exceeds their maintenance requirements from the previously reference materials. Cattle should be provided with access to an appropriate quantity and quality of balanced nutrition that meets their physiological needs. It should be noted that cattle in certain climates and production systems may experience short term periods of below maintenance nutrition without compromise their welfare. Where cattle are maintained in extensive conditions, short term exposure to climatic extremes may prevent access to nutrition that meets their daily physiological needs. In such circumstances the *animal handler* should ensure that the period of reduced nutrition is not prolonged and that mitigation strategies are implemented if welfare is at risk of being compromised.~~

~~*Animal handlers* should have adequate knowledge of appropriate body condition scores for their cattle and should not allow body condition score to drop below fall outside these an acceptable range critical thresholds. As a guide, assessing body condition score on a scale of 1 to 5, the target range for acceptable animal health and welfare should be between 2 and 4. In times of severe drought, steps should be taken to avoid starvation of animals wherever possible, including supplementary feeding, slaughter, sale or relocation of the animals, or humane killing.~~

~~In intensive production systems cattle should have access to adequate feed and water supply to meet their physiological needs.~~

~~Feedstuffs and feed ingredients should be of satisfactory quality to meet nutritional needs, and under certain circumstances (e.g., drought, frost, and flood), should be tested for the presence of substances (e.g. mycotoxins and nitrates) that can be detrimental to cattle health and welfare. Where appropriate, feed and feed ingredients should be tested for the presence of substances that would adversely impact on animal health.~~

Cattle in intensive production systems typically consume diets that contain a high proportion of grain(s) (corn, milo, barley, grain by-products) and a smaller proportion of roughages (hay, straw, silage, hulls, etc.). ~~Diets with insufficient roughage can contribute to abnormal oral behaviour in finishing cattle, such as tongue rolling.~~ As the proportion of grain increases in the diet, the relative risk of digestive upset in cattle increases. *Animal handlers* should understand the impact of cattle size; ~~and~~ age, weather patterns, diet composition and sudden dietary changes in respect to digestive upsets and their ~~negative consequences sequelae~~ (acidosis, bloat, liver abscess, laminitis). Where appropriate beef producers should consult a ~~cattle nutritionist (private consultant, university or feed company employee)~~ for advice on ration formulation and feeding programmes.

Beef producers should become familiar with potential micronutrient deficiencies or excesses for intensive and extensive production systems in their respective geographical areas and use appropriately formulated supplements where necessary.

The water quality and the method of supply can affect welfare. All cattle need adequate supply and access to palatable water that ~~also~~ meets their physiological requirements and free from contaminants ~~potentially~~ hazardous to cattle health.

Outcome-based measurables: Mortality rates, morbidity rates, behaviour, ~~changes in~~ weight ~~gain~~ and body condition ~~scoring~~, reproductive rates.

f) Flooring, bedding, resting surfaces and outdoor areas (~~litter quality~~)

In all production systems cattle need a well drained and comfortable place to rest. All cattle in a group should have sufficient space to lie down and rest at the same time.

Pen floor management in intensive production systems can have a significant impact on cattle welfare. Where there are areas that are not suitable for resting (e.g. excessive water / faecal accumulation), these areas should not be of a depth that would compromise welfare and should not comprise the whole of usable area available to the cattle.

~~Mud depth should not consistently be deeper than the ankles of cattle in pens.~~

Slopes of pens should be maintained to allow water to run off away from the feed bunks and not pool excessively in the pens.

~~If slope is not sufficient to allow for proper drainage, a mound should be constructed in each pen to allow cattle to have a dry place to lie down.~~

Pens should be ~~thoroughly cleaned after each production cycle as conditions warrant.~~ cleaned as conditions warrant and, at a minimum, after each production cycle.

If animals are housed in a slatted floor shed, the slat and gap widths should be appropriate to the hoof size of the animals to prevent injuries.

In straw or other bedding systems, the bedding should be maintained to provide ~~allow~~ animals a dry and comfortable place in which to lie.

Surfaces of concrete alleys should be grooved or appropriately textured to provide adequate footing for cattle.

Outcome-based measurables: Morbidity rates (e.g lameness, pressure sores), behaviour, changes in weight gain, and body condition score, and physical appearance.

g) Social environment

Management of cattle ~~in outdoor and indoor intensive production systems methods~~ should take into account the social environment of cattle as it relates to animal welfare, particularly in intensive systems. Problem areas include: buller agonistic and mounting activity, mixing of heifers and steers, feeding cattle of different size and age in the same pens, insufficient space at the feeder, insufficient water access and mixing of bulls.

~~In the case of buller animals, they should be identified and removed from the pen immediately. Beef producers should utilize management practices to reintroduce these animals. If reintroduction fails these animals will have to housed separately from the pen mates. Animal handlers should work to feed cattle of the same size and age in the same pens. Depending on feeding systems, health status of the animals and size of the animals beef producer will need to allow adequate feeder space and water access for the cattle.~~

Management of cattle in all systems should take into account the social interactions of cattle within groups. The animal handler should understand the dominance hierarchies that develop within different groups and focus on high risk animals (e.g. very young, very old, small or large size for cohort group) for evidence of bullying and excessive mounting behaviour. The animal handler should understand the risks of increased agonistic interactions between animals, particularly after mixing groups. Animals that are suffering from excessive agonistic activity or mounting behaviour should be removed from the group.

Where the mixing of horned and non horned cattle is likely to increase the risk of injury, these classes of animals should not be mixed.

Adequate fencing should be provided to minimise any animal welfare problems that may be caused by mixing of inappropriate groups of cattle.

Outcome-based measurables: Behaviour, physical appearance, changes in weight gain and body condition score, morbidity and mortality rate.

h) Stocking density

High stocking densities may have an adverse effect on growth rate, feed efficiency, survivability, carcass quality and behaviour (e.g. locomotion, resting, feeding and drinking).

~~In extensive outdoors systems stocking density should be managed to ensure an adequate feed supply for the cattle.~~

Stocking density should be managed such that crowding does not adversely impact key components of affect normal behaviour of cattle. ~~This~~ includes the ability to lie down freely without the risk of injuries, move freely around the pen and access feed and water. Stocking density should also be managed such that weight gain and duration of time spent lying is not adversely affected by crowding. ~~Excessive~~ If tongue rolling ~~can be associated with overcrowding of confined cattle.~~ is seen, measures should be taken such as reducing stocking density.

In extensive systems, stocking density should be managed to ensure an adequate feed supply for the cattle or the cattle should be moved regularly or provided with supplementary feed.

Outcome-based measurables: Behaviour, morbidity rate, mortality rate, changes in weight gain and body condition score, physical appearance.

~~i) Outdoor areas~~

~~Not applicable.~~

ii) Protection from predators

~~Where practical,~~ Cattle should be protected as much as possible from predators.

Outcome-based measurables: Mortality rate, morbidity rate (injury rate), behaviour, physical appearance.

### 3. Management

#### a) Genetic selection

Welfare and health considerations, in addition to productivity, should be taken into account when choosing a breed or subspecies for a particular location or production system. Examples of these include nutritional maintenance requirement, ectoparasite resistance and heat tolerance.

Individual animals within breed can be genetically selected to propagate offspring that exhibit the following traits beneficial to animal health and welfare: These include Maternal ability, ease of calving, birth weight, milking ability, body conformation and temperament.

Outcome-based measurables: Morbidity rate, mortality rate, behaviour, physical appearance, reproductive efficiency.

#### b) Reproductive management

Dystocia can be a welfare risk to beef cattle. Heifers should not be bred before they are physically mature enough to ensure the health and welfare of both dam and calf at birth. The sire has a highly heritable effect on final calf size and as such can have a significant impact on ease of calving. Sire selection should therefore account for the maturity and size of the female. Heifers and cows should not be implanted, inseminated or mated in such a way that the progeny results in increased risk to dam and calf welfare.

Pregnant cows and heifers should be managed during pregnancy so as not to become too fat or too thin. Excessive fatness increases the risk of dystocia, and both excessive condition gain and loss increase the risk of metabolic disorders during late pregnancy or after parturition.

Where possible, cows and heifers should be monitored when they are close to calving. Animals observed to be having difficulty in calving should be assisted by a competent operator as soon as possible after they are detected.

Outcome-based measurables: morbidity rate (rate of dystocia), mortality rate (cow and calf), reproductive efficiency

#### c) Colostrum

Calves are born without any immunity. Ensuring that each calf receives sufficient colostrum (first milk) immediately after calving is one of the most important factors in ensuring their survival and health. Colostrum contains both antibodies (immunoglobulins, which protect against specific diseases and anti-infective protective agents, such as lactoferrins, which prevent bacterial growth. Receiving adequate immunity from colostrum generally depends on the volume and quality of colostrum ingested, and how soon after birth the calf receives it.

As the ability of the calf to absorb immunoglobulins starts to decline progressively after 4 to 6 hours, and ceases around 24 hours after birth, the earlier a calf is fed/suckles, the greater the level of immunoglobulin absorption.

Where possible, animal handlers should ensure that calves receive sufficient colostrum within 24 hours of birth.

Outcome-based measurables: mortality rate, morbidity rate, changes in weight.

#### b)d) Weaning

~~For the purposes of this Chapter, Weaning means is the term used to describe the~~ transfer of the calf ~~from a milk based diet (from nursing the dam or being fed with milk or milk replacer) to a fibrous diet from nursing the dam or being fed with milk or milk replacer.~~ In beef cattle production systems, weaning can be a stressful time in the calf's life.

Calves should be weaned only when their ruminant digestive systems ~~has~~ developed sufficiently to enable them to maintain growth and welfare.

~~The practice of creep feeding is sometimes utilised prior to weaning to help the calf more easily adapt to a solid diet.~~

There are different weaning strategies utilised in the beef cattle production systems. These could include abrupt separation, fence line separation and the use of devices placed in the nose of the calf to discourage suckling.

Special care should be taken if abrupt weaning is immediately followed by additional stressors such as transportation, off farm as ~~research has shown that~~ calves are at risk of increased morbidity under these circumstances.

Beef cattle producers should seek expert advice on the most appropriate time and method of weaning for their type of cattle and production system.

Outcome-based measurables: Morbidity rate, mortality rate, behaviour, physical appearance, changes in weight gain and body condition score.

#### e)c) Painful husbandry procedures

~~Surgical~~ Husbandry practices that have the potential to cause pain are routinely practiced on cattle for reasons of production efficiency, animal health and welfare and human safety. Where possible, these procedures should be performed in such a way as to minimise any pain and stress to on the animal. ~~Options to consider including the performing the procedure at as early an age as possible or where appropriate use of analgesia.~~ Performing these procedures at as early an age as possible or using anaesthesia and/or analgesia should be considered under the recommendation or supervision of a veterinarian.

Future options for enhancing animal welfare in relation to these procedures include: 1) ceasing the procedure and addressing the current need for the operation through management strategies; 2) breeding animals that do not require the procedure; or 3) replacing the current procedure with a non-surgical alternative that has been shown to enhance animal welfare; ~~or 4) performing the procedure in a way that minimises pain.~~

Example of such interventions include: castration, dehorning, ovariectomy (spaying), tail docking, identification.

#### i) Castration

Castration of beef cattle is performed in many production systems to reduce inter-animal aggression, improve human safety, ~~remove~~ avoid the risk of unwanted pregnancies in the herd, and enhance production efficiency ~~by producing beef that better meets market requirements.~~

Where it is necessary to castrate beef cattle, producers should seek guidance from veterinarians as to the optimum method and timing for their type of cattle and production system.

Methods of castration used in beef cattle include surgical (knife) removal of the testes, ischaemic methods (banding or ringing), and crushing and disruption of the spermatic cord (Burdizzo operation).

Where practical, cattle should be castrated before the age of 3 months, or at the first available handling opportunity beyond this age.

Producers should seek guidance from veterinarians on the availability and advisability of analgesia/anaesthesia for castration of beef cattle, particularly in older animals.

Operators performing castration of beef cattle should be trained and competent in the procedure used, and be able to recognise the signs of complications.

<u>Castration</u>			
<u>Procedure</u>	<u>Specific method</u>	<u>Key animal welfare requirements</u> <u>Applicable</u>	<u>Comment</u>
<u>Burdizzo method</u>	<u>This procedure requires the male calf to be restrained as the Burdizzo device is placed on the scrotum above the testicles and is closed to crush and disrupt the spermatic cord. Each spermatic cord is crushed separately. This action severs the blood supply to the testicles causing them to degenerate.</u>	<u>High level of operator competency, competent operation and maintenance of equipment; restraint; accuracy.</u>	<u>This method shuts off the blood supply to the testicle and causes the testicle to be reabsorbed if properly done (bloodless and no open wound).</u> <u>The Burdizzo procedure requires certain skill to use properly and may result in only partial castration depending on competency of the operator.</u> <u>Post-castration discomfort or pain from the use of the Burdizzo is comparable with other castration methods.</u> <u>Cannot visually confirm if procedure has been successful.</u> <u>A veterinarian should be consulted on how to control pain during such procedures.</u>
<u>Rubber ring method</u>	<u>Small rubber rings are used for calves less than one month of age (rubber ring castration), and for older calves heavy wall latex bands are used along with a grommet to securely fasten the mechanically tightened bands at the appropriate tension. After several weeks, the testicles and scrotum degenerate and slough from the body.</u>	<u>High level of operator competency, competent operation and maintenance of equipment; restraint; accuracy.</u>	<u>Post-castration discomfort may be prolonged by this method compared with other castration methods.</u> <u>High tetanus risk</u> <u>A veterinarian should be consulted on how to control pain during such procedures.</u>

<u>Banding method</u>	<u>A fast, easy and effective non-surgical method of castrating large animals.</u>	<u>High level of operator competency, competent operation and maintenance of equipment; restraint; accuracy.</u>	<u>Post-castration discomfort may be prolonged by this method compared with other castration methods.</u> <u>High tetanus risk.</u> <u>A veterinarian should be consulted on how to control pain during such procedures.</u>
<u>Surgical method.</u>	<u>Removal of the testicles using sharp cutting instruments and emasculators involves opening the scrotum and removing the testicles by severing them from the spermatic cords.</u>	<u>High level of operator competency, competent operation and maintenance of equipment; restraint; accuracy.</u>	<u>Risk of haemorrhage is greater after surgical castration.</u> <u>Post-castration discomfort is normally not as long as it is when elastrators are used.</u> <u>Potential complications associated with castration include haemorrhage, excessive swelling or oedema, infection, poor wound healing, and failure</u> <u>A veterinarian should be consulted on how to control pain during such procedures.</u>
<u>Chemical castration</u>	<u>Chemical castration includes injection of sclerosing or toxic agents (e.g. 88% lactic acid) into the testicular parenchyma to cause irreparable damage and loss of function.</u>	<u>High level of operator competency, competent operation and maintenance of equipment; restraint; accuracy.</u> <u>The procedures are bloodless but require extreme skill because chemical substances must be injected directly into the testicles.</u> <u>Chemical castration requires additional procedural time and technical skill, and almost twice the healing time compared with surgical castration.</u>	<u>Studies have reported that 25% of the chemically castrated calves had scrotal necrosis caused by the high pressure of injection and drug leakage from the testes.</u> <u>A veterinarian should be consulted on how to control pain during such procedures.</u>

ii) Dehorning (including disbudding)

Beef cattle ~~which that~~ are naturally horned are commonly dehorned in order to reduce animal injuries and hide damage, improve human safety, reduce damage to facilities and facilitate transport and handling. Where practical and appropriate for the production system, the selection of polled cattle is preferable to ~~can remove the need for~~ dehorning.

Where it is necessary to dehorn beef cattle, producers should seek guidance from veterinary advisers as to the optimum method and timing for their type of cattle and production system.

Where practical, cattle should be dehorned while horn development is still at the horn bud stage, or at the first available handling opportunity beyond this age. This is because the procedure involves less tissue trauma when horn development is still at the horn bud stage, and there is no attachment of horn to the skull of the animal.

Methods of dehorning (disbudding) at the horn bud stage include removal of the horn buds with a knife, thermal cautery of the horn buds, or the application of chemical paste to cauterise the horn buds. Methods of dehorning when horn development has commenced involve the removal ~~through~~ of the horn by cutting or sawing ~~at~~ through the base of the horn close to the skull.

Producers should seek guidance from veterinarians on the availability and advisability of analgesia/anaesthesia for dehorning of beef cattle, particularly in older animals, where horn development is more advanced.

Operators performing dehorning of beef cattle should be trained and competent in the procedure used, and be able to recognise the signs of complications.

<b>Dehorning/disbudding</b>			
<b><u>Procedure</u></b>	<b><u>Specific method</u></b>	<b><u>Key animal welfare requirements applicable</u></b>	<b><u>Comment</u></b>
<u>Disbudding (thermo-cautery)</u>	<u>Hot-iron disbudding is performed by applying the hot-iron device, electric or butane-gas heated to over 600°C, over the horn bud destroying the growing tissue at its base. This method is performed when horn-buds are evident by palpation which usually occurs at an age of 2–8 weeks.</u>	<u>High level of operator competency, competent operation and maintenance of equipment; restraint; accuracy.</u>	<u>The different methods of horn removal can be ranked on the basis of the acute stress (cortisol) and behavioural responses and the production effects.</u>  <u>Methods that elicit less struggling during the procedure and lower overall distress responses are preferred.</u>  <u>A veterinarian should be consulted on how to control pain during such procedures.</u>
<u>Caustic paste</u>	<u>Paste disbudding is caused by the chemical burn of underlying tissue. The active ingredient used for disbudding is usually sodium hydroxide or calcium hydroxide.</u>  <u>These strong alkalis cause liquefactive necrosis, resulting in saponification of fats and denaturation of proteins, which allows deeper penetration of the chemical. With caustic burns, tissue damage continues to increase as long as the active chemical is in contact with the tissue.</u>	<u>High level of operator competency, competent operation, restraint; Accuracy.</u>  <u>The evidence indicates that caustic paste disbudding causes distress for at least 3 h and that local anaesthesia is efficient in controlling pain for the first hour but discomfort returns after the nerve blocking subsides.</u>	<u>A veterinarian should be consulted on how to control pain during such procedures.</u>  <u>Inert lying is a sign of distress in young calves after caustic paste disbudding.</u>  <u>Caustic dehorning chemicals should only be used with care. They can spread into the eyes if the skin gets wet.</u>

<b>Dehorning/disbudding</b>			
<b>Procedure</b>	<b>Specific method</b>	<b>Key animal welfare requirements applicable</b>	<b>Comment</b>
<u>Dehorning methods</u> 1. <u>Scoop dehorning</u> 2. <u>Guillotine shears</u> 3. <u>Saw</u> 4. <u>Foetotomy</u> 5. <u>Cryosurgery</u>	<u>Dehorning of older cattle is carried out by various methods and includes:</u> 1. <u>Scoop dehorning consists of two interlocking semicircular blades attached to handles that amputate the horn close to the underlying bone. Scoop dehorning which may cause either shallow or deep impact on the underlying bone and surrounding skin</u> 2. <u>Guillotine shears / crange device.</u> 3. <u>Saw - where the horn is cut close to the skull bone using a tenon saw. 4). Foetotomy wire – where the horn is cut close to the skull bones by repeated sawing with a foetotomy wire.</u> 5. <u>Cryosurgery</u>	<u>High level of operator competency, competent operation and maintenance of equipment; restraint; accuracy.</u>  <u>The cortisol responses of male Friesian calves (5 to 6 mo of age) to amputation dehorning by each of the first 4 methods listed were similar, suggesting that the degree of distress and pain caused by the different methods of dehorning are similar.</u>	<u>There is a complete absence of literature available on other methods of amputation dehorning (foetotomy wire, saw, guillotine crange) and alleviation of the associated pain.</u>  <u>A veterinarian should be consulted on how to control pain during such procedures.</u>
<u>Tipping of the horn</u>	<u>Removal of the non-sensitive tip of the horn</u>	<u>High level of operator competency, competent operation, restraint; accuracy.</u>	<u>A veterinarian should be consulted on how to control pain during such procedures.</u>

iii) Ovariectomy (Spaying) (~~ovariectomy~~)

Ovariectomy Spaying of heifers is sometimes required for international trade or to prevent unwanted pregnancies under extensive rangeland conditions. Surgical spaying should be performed by veterinarians or by highly trained operators. Producers should seek guidance from veterinarians on the availability and advisability of analgesia/anaesthesia for spaying of beef cattle. The use of analgesia/anaesthesia should be encouraged.

<b>Spaying</b>			
<b>Procedure</b>	<b>Specific method</b>	<b>Key animal welfare requirements applicable</b>	<b>Comment</b>
<u>Spaying</u>	<u>Ovarian removal by flank incision</u>	<u>High level of operator competency, hygienic operation and maintenance of equipment; restraint; accuracy.</u>	<u>Produces a longer-lasting inflammatory response than per vagina method</u>  <u>Mortality rates in studies shown as comparable or slightly higher than per vagina method</u>  <u>Administration of local anaesthetic where applied may produce less complications than epidural block for per vagina method.</u>  <u>Applicable to different stages of pregnancy, but results in abortion if gestation is less than 4.5 months</u>

<u>Spaying (contd)</u>			
<u>Procedure</u>	<u>Specific method</u>	<u>Key animal welfare requirements applicable</u>	<u>Comment</u>
	<u>'Willis' dropped ovary technique (per vagina approach)</u>	<u>High level of operator competency, hygienic operation and maintenance of equipment; restraint; accuracy.</u>	<u>Produces a shorter-lasting inflammatory response than per vagina method, but a comparable stress and behavioural response</u> <u>Mortality rates in studies shown as comparable or slightly lower than flank method</u> <u>Epidural administration of local anaesthetic where applied may produce a greater risk of complications than local or regional block for flank method.</u> <u>Applicable only for non-pregnant, or early pregnancy (&lt; 4 months). Results in abortion if pregnant animal is thus spayed.</u> <u>Greater risk of leaving ovarian tissue intact if operator not fully experienced.</u>
	<u>Ovarian removal by vaginal incision</u>	<u>High level of operator competency, hygienic operation and maintenance of equipment; restraint; Accuracy.</u>	<u>Similar method to Willis technique, but requires larger vaginal incision and manual manipulation removal of the ovaries. Tissue trauma is likely to be greater.</u>

## iv) Tail docking

Tail docking has been performed in beef cattle to prevent tail tip necrosis in confinement operations. Research shows that increasing space per animal and proper bedding are effective ~~means~~ in preventing tail tip necrosis. Therefore it is not recommended for producers to dock the tails of beef cattle.

## v) Identification

Ear-tagging, ear-notching, tattooing, freeze branding and radio frequency identification devices (RFID) are preferred methods of permanently identifying beef cattle from an animal welfare standpoint. In some situations however hot iron branding may be required or be the only practical method of permanent identifying beef cattle. If cattle are branded, it should be accomplished quickly, expertly and with the proper equipment. Identification systems should be established also according to the Chapter 4.1. of the *Terrestrial Code* on General principles on identification and traceability of live animals.

<b>Identification</b>			
<b><u>Procedure</u></b>	<b><u>Specific method</u></b>	<b><u>Key animal welfare requirements applicable</u></b>	<b><u>Comment</u></b>
<u>Ear tagging</u>	<u>Insertion of ear tag with visible identification marks</u>	<u>Hygienic operation and maintenance of equipment; restraint; Moderate level of operator competency</u>	<p><u>Ear tagging when performed well causes little distress additional to any effects of handling and restraint.</u></p> <p><u>Poor equipment or low operator competency can increase the risk of retention failure, requiring animals to undergo additional procedures.</u></p> <p><u>Visible ear tags make identification easier from a distance, potentially reducing the need for handling, but the increased tag size can increase the risk of it being caught on fences and other objects, leading to tearing of the ear pinna and tag loss.</u></p>
	<u>Insertion of radio frequency identification device</u>	<u>Hygienic operation and maintenance of equipment; restraint; Moderate level of operator competency</u>	<p><u>Ear tagging when performed well causes little distress additional to any effects of handling and restraint.</u></p> <p><u>Poor equipment or low operator competency can increase the risk of retention failure, requiring animals to undergo additional procedures.</u></p> <p><u>The risk of retention failure is lower in RFID-only tags because they are smaller, but tag reading requires specialized equipment at a short distance (&lt; 1m).</u></p>
<u>Tattooing</u>	<u>Ear tattooing</u>	<u>Hygienic operation and maintenance of equipment; restraint; Moderate level of operator competency</u>	<p><u>Ear tattooing when performed well is permanent and causes little distress additional to any effects of handling and restraint.</u></p> <p><u>Because the tattoo can only be read at close quarters, animals may need to be restrained for subsequent identification checks, or the tattoo may be need to be supplemented by an additional form of identification, requiring an additional procedure.</u></p>
<u>Ear notching</u>		<u>Hygienic operation and maintenance of equipment; restraint; Moderate to high level of operator competency</u>	<p><u>Ear notching results in a slightly larger area of tissue damage than tagging or tattooing and therefore can cause more discomfort or pain.</u></p> <p><u>Has the advantage of being permanent if applied correctly.</u></p> <p><u>Ear notching may be more suitable for herd identification, as the number of variations available is less than for other identification methods.</u></p> <p><u>Subsequent hair growth or ear trauma can obscure the identification notch.</u></p> <p><u>Risk of infection or parasite infestations (miasis)</u></p>

<u>Identification</u>			
<u>Specific method</u>	<u>Specific method</u>	<u>Specific method</u>	<u>Specific method</u>
<u>Branding</u>	<u>Freeze branding</u>	<u>High level of operator competency, hygienic operation and maintenance of equipment; restraint; accuracy.</u>	<u>Thermal injury and subsequent inflammatory response has the potential to cause a moderate degree of discomfort and pain, and a good result is highly dependent on operator competence.</u> <u>Freeze branding may be less effective on white or light coat coloured cattle.</u> <u>Results in a permanent brand when applied appropriately.</u> <u>Requires specialized equipment and can be expensive and more time-consuming than other methods.</u>
	<u>Hot iron branding</u>	<u>High level of operator competency, hygienic operation and maintenance of equipment; restraint; Accuracy.</u>	<u>Thermal injury and subsequent inflammatory response caused by heated iron contact has the potential to cause a significant degree of discomfort and pain.</u> <u>A good identification marking is highly dependent on operator competence.</u> <u>Leaving the brand in contact with the skin for longer than the minimum time necessary can cause thermal injury to subcutaneous structures and severe tissue trauma.</u> <u>Hot-iron branding is permanent, and in some environments may currently be the only practical means of individual animal identification.</u> <u>Risk of infection or parasite infestations (miasis).</u>

Outcome-based measurable: ~~Rate of postprocedural~~ complications rate, ~~mortality~~ morbidity rate, behaviour, physical appearance, changes in weight gain and body condition score.

#### 4f) Handling and inspection

Beef cattle should be inspected at intervals appropriate to the production systems and the risks to the health and welfare of the animals. In intensive farming systems, animals should be inspected at least once a day.

Some animals may benefit from more frequent inspection for example: neonatal calves, cows in late gestation, newly weaned calves, and cattle experiencing environmental stress and ~~after those that have undergone~~ painful husbandry or veterinary surgical procedures.

*Animal handlers* need to be competent in recognising the clinical signs of health, disease and welfare of beef cattle.

Beef cattle identified as sick or injured should be given appropriate treatment at the first available opportunity by competent and trained *animal handlers*. If *animal handlers* are unable to provide appropriate treatment, then the service of veterinarians should be enlisted.

If ~~prognosis~~ of the animal's condition ~~suggests the prognosis is poor with little chance of recovery, humane euthanasia of the animal should be considered~~ the prognosis is poor with little chance of recovery, humane euthanasia of the animal should be considered the animal should be humanely killed as soon as possible. For a description of methods for the humane killing of beef cattle see Article 7.6.5. ~~of the OIE Terrestrial Code.~~

Recommendations on the handling of cattle are also found in Chapter 7.5. ~~and Articles 7.5.1. and 7.5.2. of the OIE Terrestrial Code.~~

Where beef cattle are herded into a handling facility from extensive conditions, they should be moved quietly and calmly. Weather conditions should be taken into account and cattle should not be herded in excessively hot or cold conditions. Cattle should not be driven to the point of ~~distress~~ collapse. In situations where the gathering and handling of the cattle is likely to be stressful, consideration should be given to the avoidance of multiple handling events by combining necessary management procedures within the one handling event. Where handling itself is not stressful, management procedures should be staged over time to avoid additive stress of multiple procedures.

Properly trained dogs can be effective ~~tools~~ aids for cattle herding. Cattle are adaptable to different visual environments. However, exposure of cattle to sudden or persistent movement or visual contrasts should be minimised where possible to prevent stress and fear reactions.

Electro immobilisation should not be used.

Outcome-based measurables: Handling response, morbidity rate, mortality rate, behaviour, reproductive efficiency, changes in weight gain and body condition score.

#### e) g) Personnel training

All people responsible for beef cattle should be competent according to their responsibilities and should understand cattle husbandry, behaviour, biosecurity, general signs of disease, and indicators of poor animal welfare such as stress, pain and discomfort, and their alleviation.

Competence may be gained through formal training and/or practical experience.

Outcome-based measurables: Handling response, morbidity rate, mortality rate, behaviour, reproductive efficiency, changes in weight gain and body condition score.

#### f) h) Emergency plans

Where the failure of power, water and feed supply systems could compromise animal welfare, beef producers should have contingency plans to cover the failure of these systems—power, water and feed supply. These plans may include the provision of fail-safe alarms ~~devices~~ to detect malfunctions, back up generators, access to maintenance providers, ability to store water on farm, access to water cartage services, adequate on-farm storage of feed and alternative feed supply.

Plans should be in place to minimise and mitigate the effects of natural disasters or extreme climatic conditions e.g., heat stress, drought, blizzard and flooding. Humane killing procedures for sick or injured animals should be part of the emergency action plan. In drought, animal management decisions should be made as early as possible and these should include a consideration of reducing cattle numbers. Emergency plans should also cover the management of the farm in the face of an emergency disease outbreak, consistent with national programmes and recommendations of Veterinary Services as appropriate.

~~g)~~ Location, construction and equipment of farms

Farms for beef cattle should be situated in an appropriate geographical location for the health, welfare and productivity of the animals ~~while considering environmental sustainability.~~

All facilities for beef cattle should be constructed, maintained and operated to minimise the risk to the welfare of the animals ~~and human safety.~~

Equipment for handling and restraining beef cattle should only be used in a way that minimises the risk of injury, pain or distress.

Cattle in intensive or extensive production systems ~~should~~must be offered adequate space for comfort,and socialisation ~~and environmental management.~~ ~~Whenever possible, beef cattle housed in intensive production systems should have access to pasture.~~

In intensive production systems the feeder should be sufficiently large so that animals have adequate access to feed and they should be clean and free of spoiled, moldy, sour, packed or unpalatable feed. Also cattle should have access to ~~clean and clear~~ water at all times.

Floors in housing facilities should be properly drained, and barns and handling alleys should provide traction to prevent injuries to animals and handlers.

Handling alleys and housing pens ~~should~~must be free of sharp edges and protrusions to prevent injury to animals and handlers.

~~Design and operate~~ Alleys and gates should be designed and operated to avoid impeding cattle movement. ~~Avoid~~ Slippery surfaces should be avoided, especially where cattle enter a single file alley leading to a chute or where they exit the chute. Grooved concrete, metal grating (not sharp), rubber mats or deep sand can be used to minimise slipping and falling. Quiet handling is essential to minimise slipping. When ~~operating~~ gates and catches are operated, ~~reduce~~ excessive noise should be minimised, ~~which because it~~ may cause distress to the animals.

Adjust hydraulic or manual restraining chutes to the appropriate size of cattle to be handled. Hydraulic or pneumatic operated restraining equipment should have pressure limiting devices to prevent injuries. Regular cleaning and maintenance of working parts is imperative to ensure the system functions properly and is safe for the cattle and handlers.

Mechanical and electrical devices used in housing facilities ~~should~~must be safe for animals ~~and humans.~~

Dipping baths are sometimes used in beef cattle production for ectoparasite control. Where these are used, they should be design and operated to minimise the risk of crowding, injury or drowning.

The loading of the animals at the farms should be conducting accordingly to Chapters 7.2., 7.3. and 7.4. (~~Transport of animals by sea, land and air respectively~~).

Outcome-based measurables: Handling response, morbidity rate, mortality rate, behaviour, changes in weight gain and body condition score, physical appearance, lameness.

~~h)~~ On farm harvesting

Refer to point 3e) of Article 7.X.5.

ii) Humane killing

~~For sick and injured animals a~~ prompt diagnosis should be made to determine whether the animal should be humanely killed or receive additional care.

~~Animal handlers should provide feed and water to non-ambulatory cattle at least once daily~~

~~Non-ambulatory animals should be moved very carefully and dragging non-ambulatory animals is unacceptable.~~

~~Likewise, animals should not be lifted with chains onto transportation conveyances. Acceptable methods of transporting non-ambulatory animals include a sled, low-boy trailer or in the bucket of a loader.~~

~~When treatment is attempted, cattle that are unable to sit up unaided and refuse to eat or drink should be humanely euthanized as soon as recovery is deemed not possible.~~

~~Cattle that are non-ambulatory must not be sent to a livestock market or to a processing facility.~~

~~Humane killing should occur without pain or suffering.~~

The decision to humanely kill an animal and the procedure itself should be undertaken by a competent person.

Reasons for ~~euthanasia~~ humane killing may include:

- i) severe emaciation, weak cattle that are non-ambulatory or at risk of becoming downers;
- ii) non-ambulatory cattle that will not ~~sit~~ stand up, refuse to eat or drink, have not responded to therapy;
- iii) rapid deterioration of a medical condition for which therapies have been unsuccessful;
- iv) severe, debilitating pain;
- v) compound (open) fracture;
- vi) spinal injury;
- vii) central nervous system disease; and
- viii) multiple joint infections with chronic weight loss.

For a description of ~~other~~ methods for the humane killing of beef cattle see Article 7.6.5. ~~of the~~ *Terrestrial Code*.